REMARKS

This application was filed with 27 claims which are pending in their original form. Claims 1, 2, 5-18, 21, 23, 26 and 27 have been rejected. Claims 3, 4, 19 and 20 are objected to. Claims 22, 24 and 25 have been allowed. Reconsideration of the rejected claims based on the remarks submitted below is respectfully requested.

Claim Rejections - 35 U.S.C. § 102(e)

Claims 1, 2, 5-18, 21, 23, 26 and 27 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Dowling. For all the reasons set forth below, it is respectfully submitted that these claims are not anticipated by Dowling and are in condition for allowance.

As used in the present application, "flux imbalance" is caused by DC currents in the windings of a transformer. However, Dowling does not mention anywhere within his patent that DC power is provided by a central site, such as a central office, to a remote site. Furthermore, Dowling does not even use the term signal quality or discuss flux imbalances. Thus, as an initial matter, Dowling fails to even mention the problems that the present invention is directed toward solving.

The patent of Dowling (US 6,522,688) is directed at an improved CODEC. The details of the improved CODEC are described within the Dowling specification. The inventors of the present application have studied the teachings of Dowling and find no disclosure or suggestion that the arrangements of his components could be used to cancel flux imbalance. Flux imbalance is caused by an imbalance of DC

currents flowing in the windings of a transformer. Since Dowling does not have a DC powering circuit shown in any of his figures or described within his specification, he does not describe, disclose, suggest or teach how to cancel flux caused by DC current imbalances. The terms flux and signal quality are simply not mentioned anywhere within the '688 patent to Dowling and the circuit of Dowling would not function to reduce any flux imbalance.

In accordance with the present invention, a flux imbalance, which is caused by a DC current, may be removed by injecting an opposing DC current in the windings of the transformer. In order to provide DC currents to reduce or essentially remove the flux imbalances, the inventors disclose an embodiment wherein signal quality is monitored. A signal quality value, the output of the monitoring processes, is input to a flux controller. In order to improve the signal quality (caused by DC imbalance), a DC current is injected and is incrementally adjusted via a feedback process as described in the algorithms shown in FIGS. 4, 6, and 7. Conversely, the echo cancellers (325, 335) of Dowling, as is well-known in the art, provide replicas of unwanted communications signals, to subtract from received and transmitted signals in order to reduce the amount of unwanted communication signals within the received and transmitted signals. Dowling simply does not teach how to cancel a DC flux imbalance, or an unwanted DC current, caused by the DC current of a power source flowing in the wire pair (137) and through the transformer windings. In fact, it does not appear from the specification of the '688 patent that Dowling is even aware of the flux imbalance

problem since nowhere within his specification does he mention DC power, flux or flux imbalance. Telecommunication engineers and the present inventors understand that echo cancellers are used to cancel echoes in full duplex data communications systems. However, echoes are AC signals whereas flux imbalance is a DC current phenomena, not an AC phenomena associated with echo cancellers

The present invention as claimed in the various independent claims has a distortion or signal quality monitor and a flux controller for determining when a flux cancellation signal is needed. The echo cancellers 325 and 335 of Dowling function to filter and cancel echoes but do not function to cancel flux imbalances. The output of the flux generator is a DC voltage, provided in incremental steps, whereas the output of Dowling's echo cancellers 325 and 335 are replicas of the transmitted and received communication signals coming out of the summers 320 and 345. Thus, the circuit of Dowling does not correct flux imbalances.

In particular with regard to the claims, claim 1 recites "a data communications system using a power feeding arrangement". The circuit of Dowling does involve "a power feeding arrangement" and there is no mention whatsoever of power being sent along the transmission lines in Dowling. With regard to Fig. 3A of Dowling, the specification states "the line interface circuit 305 is operative to couple an **analog** signal from the bi-directional two-wire interface to the receive-signal output coupling and an **analog** signal to the bi-directional two-wire interface from the transmit-signal input coupling". Col. 17, Lines 60-64. Clearly, these analog signals are communication signals, not DC power signals.

Thus, since Dowling does not involve a "power feeding arrangement", Dowling does not have the flux problems associated with DC currents toward which the present invention is directed to solving. Therefore, it is respectfully submitted that claim 1 is not anticipated by Dowling.

Claim 1 further recites "a distortion monitoring circuit having a monitoring input coupled to the equipment side winding of the coupling transformer and operative to generate at an error output an error signal corresponding to measurements of the signal distortion sampled by the monitoring circuit". The Office Action takes the position that this limitation reads upon the local echo canceller 325, low pass filter 310, analog-to-digital converter 315 and subtractor 320. However, nowhere does Dowling disclose or suggest that the above elements monitor the overall distortion of a signal. He uses the elements for the sole purpose of canceling echoes. The use of echo cancellers to cancel echoes is well-known in the art of data communication circuits. However, the present inventors are unaware of any instances (except in the present application) where flux imbalances are cancelled using echo cancellers. The local echo canceller 325 of Dowling simply subtracts the transmitted signal's echoes from the received signal. Thus, the output of the subtractor 320 is not an error output; it is the corrected received signal. Unlike the distortion monitoring circuit recited in claim 1, the local echo canceller 325 simply feeds back a modified representation of the transmitted signal back to the receiver input. Therefore, it is respectfully submitted that Dowling does not describe or suggest a distortion monitoring circuit as recited in claim 1.

Claim 1 further recites "a flux controller having a control input in electrical communication with the error output of the distortion monitoring circuit and operative to generate at a control output a flux cancellation signal". The Office Action takes the position that the remote echo canceller 335 of Dowling satisfies this limitation. However, the remote echo canceller 335 of Dowling does not generate a "flux cancellation signal". A remote echo canceller 335 such as used in Dowling merely removes echoes of the received signal from the transmitted signal and does not cancel non-linear distortion components such as those generated by transformer non-linearities such as flux imbalances. Furthermore, the input to the remote echo canceller 335 is not an error signal, it is the corrected received communication signal. As stated in the specification of the present application, the output of an echo canceller contains indications of the flux imbalance in transformer. Because an echo canceller includes signals resulting from flux imbalances in the transformer, an echo canceller can be used for the distortion monitoring circuit also recited in claim 1. However, non-linear distortions such as caused by flux imbalances can not simply subtracted out in the same manner as echoes are with the circuit of Dowling. See Page 9, line 20 – Page 10, line 6 of the present application. Thus, although the output of remote echo canceller 335 contains indications of the flux imbalance, as does the entire circuit subjected to the flux imbalance, the output of the echo canceller 335 in Dowling is not "a flux cancellation signal". Basically, in overly simple terms, an echo canceller cancels echoes while a flux canceller uses an echo canceller output to monitor flux

distortions. Thus, the remote echo canceller 335 of Dowling is not a "flux controller" as recited in claim 1 because it does not generate "a flux cancellation signal". Therefore, it is respectfully submitted that the flux controller of claim 1 is not described or suggested in Dowling.

Claim 1 further recites "a flux generator having a first generator input in electrical communication with the control output of the flux controller and a generator output in electrical communication with the equipment side winding of the coupling transformer, the flux generator responsive to the flux cancellation signal to generate a cancellation flux to reduce the flux imbalance". The Office Action takes the position that elements 345, 350, 325, 355, and an amplifier inside of 305 as shown in Dowling, correspond to the flux generator of claim 1. However, these elements do not generate a cancellation flux. Element 325 is simply the local echo canceller that cancels echoes in the receiver 330. Moreover, the signal provided to the equipment side winding of the transformer is not a cancellation flux, it is a modified transmit signal that does nothing to "reduce the flux imbalance". In fact, element 325 is the local echo canceller 325 that the Office Action says corresponds to the distortion monitoring circuit also recited in claim 1. It is a respectfully submitted that the local echo canceller 325 can not be both the "distortion monitoring circuit" and the "flux generator" as these elements perform completely different functions. In fact, the output of the local echo canceller 325 of Dowling is neither a "cancellation flux" nor a signal "corresponding to measurements of the signal distortion", and certainly it is not both. The output of

the echo canceller 325 is a simply signal that represents the echoes present in the receiver and it is not provided to the transformer windings. Therefore, it is most respectfully submitted that the flux generator of claim 1 is not anticipated by Dowling.

It should be noted that elements 310, 315, 320 and 325 in Fig. 3 of Dowling are a mirror image of elements 335, 345, 350 and 355 in Fig. 3 of Dowling. Elements 310, 315, 320 and 325 constitute a local echo canceller for the receiver 330 while elements 335, 345, 350 and 355 constitute a remote echo canceller for the transmitter 340. They do not function together to correct flux imbalances. Conversely, as recited in claim 1, the distortion monitoring circuit, flux controller and flux generator are separate elements that are basically connected in series one providing an output to the other with flux generator providing its output to the transformer windings. Therefore, for all the reasons set forth above, it is respectfully submitted that claim 1 is not anticipated by Dowling.

Claims 2 and 5-9 depend from claim 1 and, thus, are not anticipated by Dowling for all the reasons set forth above with respect to claim.

Claim 10 recites a "flux cancellation signal generator" that generates a "flux cancellation signal". As discussed in more detail above, Dowling does not describe or suggest such a flux cancellation generator or a flux cancellation signal. Dowling does not even acknowledge that flux imbalances occur or set forth a circuit wherein they are likely to occur. Moreover, Dowling does not set forth a circuit that can

correct flux imbalances. Therefore, it is respectfully submitted that claim 10 is not anticipated by Dowling.

Claims 11- 14 depend from claim 10 and, therefore, are also not anticipated by Dowling.

Claim 15 recites a "flux controller" that generates a "responsive flux canceller signal". As stated above, Dowling does not describe or suggest such a flux controller. Therefore, it is respectfully submitted that claim 15 is not anticipated by Dowling.

Claims 16-18 and 21 depend from claim 15 and, therefore, are also not anticipated by Dowling.

Claim 23 recites generating a "flux cancellation signal". As stated above, Dowling does not describe or suggest such a flux cancellation signal or how such a signal might be generated. Therefore, it is respectfully submitted that claim 23 is not anticipated by Dowling.

Claim 26 recites generating a "flux controller". As stated above, Dowling does not describe or suggest such a flux controller. Therefore, it is respectfully submitted that claim 26 is not anticipated by Dowling.

Claim 27 recites "adjusting a flux canceller signal". As stated above, Dowling does not describe or suggest such a "flux canceller signal". Therefore, it is respectfully submitted that claim 27 is not anticipated by Dowling.

For all the reasons set fort above, it is respectfully submitted that claims 1-27 are in condition for allowance.

Allowable Subject Matter

Applicant has commented on some of the distinctions between the cited references and the claims to facilitate a better understanding of the present invention. This discussion is not exhaustive of the facets of the invention, and Applicant hereby reserves the right to present additional distinctions as appropriate. Furthermore, while these remarks may employ shortened, more specific, or variant descriptions of some of the claim language, Applicant respectfully notes that these remarks are not to be used to create implied limitations in the claims and only the actual wording of the claims should be considered against these references.

Pursuant to 37 C.F.R. § 1.136(a), Applicant petitions the Commissioner to extend the time for responding to the February 17, 2004, Office Action for 2 months from May 17, 2004, to July 17, 2004. Applicant encloses herewith a check in the amount of $420 made payable to the Director of the USPTO for the petition fee. The indicated allowance of claim 22, 24 and 25 is gratefully acknowledged. The Commissioner is authorized to charge any deficiency or credit any overpayment associated with the filing of this Response to Deposit Account 23-0035.